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"BEHOLD IN THESE WHAT LEISURE HOURS DEMAND,—AMUSEMENT AND TRUE KNOWLEDGE HAND IN HAND."—*Cowper.*

IN THE PINE FOREST.

THE MORTONS OF MORTON HALL.

CHAPTER XXXI.—IN WHICH HENRY TALBOT IS STARTLED BY AN APPARITION IN THE DEPTHS OF THE FOREST.

DISREGARDING the advice of the backwoodsmen and fishermen of Milwaukie, who recommended him—as a stranger to forest travel—rather to choose the longer route, and to follow the windings of the Watertown River, Henry Talbot, confident in his own prowess, struck at once boldly into the forest, and soon found himself completely shut in from any view of the lake or the open country.

The forests of North America differ widely in appearance from the jungles of Asia or Africa, glowing with the gorgeous foliage of the tropics; or from the woods of Europe, often entangled with undergrowth and brambles, and variegated with the different-coloured foliage of deciduous trees.

In the western hemisphere, and particularly in the northern portion of that vast continent, the forest trees consist chiefly of larches, pines, cedars, and other, generally sombre, evergreens. The trees stand wide apart, tall and straight as the masts of a ship, the branches rarely at a less elevation than twenty feet from

the earth, and these shoot directly upwards. There is no obstruction whatever to impede the progress of the traveller, and men may easily walk four or five abreast, or horsemen may ride without difficulty through the long, regular aisles, which extend in every direction until the perspective apparently reduces them to a point in the far distance.

The soil is covered, to the depth of several inches, with a soft, yielding, springy substance, of the colour of tan, the *débris* of former trees which have died with age and rotted away, while others have grown in their place. Not a spot of verdure is to be seen; for the sun is shut out by the thickly interlaced branches high overhead, and the tan with which the soil is covered prevents the growth of grass or herbage.

The traveller seems to be walking over the softest of carpets, and not a footfall of man or beast is audible. There is no blithe twittering of birds, for the birds shun the forest depths; no busy hum of insects; no sound of living creature. The beasts of the forests hide themselves during the day, and generally prowl stealthily and silently throughout the night. It is only after nightfall that sometimes, though rarely, may be heard the low growl of the bear, the howling bark of the wolf, or the shrill, unearthly scream of some bird of night—sounds calculated to strike terror to the heart of the traveller.

In the depth of the forest, even at midday, a sombre gloom prevails, somewhat resembling the "dim, religious light" shed through the painted-glass windows of the chancel of a cathedral, while during the night everything is wrapped in utter Egyptian darkness. From day to day the traveller wanders on without the slightest change being perceptible to his eye, and without meeting with a living creature, and if he be provided for the journey, and have a pocket-compass to direct his course, he will, probably, in course of time, reach his destination in safety.

Woe, however, to the inexperienced traveller who enters the dark forest of the Far-west without compass or guide. Having been warned of the difficulties that he will meet with, and told what precautions to take when he first enters the forest, he laughs at the idea. Nothing seems more easy than to pursue a straight path through the long apparently interminable aisles of trees—nothing, in reality, is more difficult. He walks on for hours, and fancies that he has not swerved a yard from the straight path—that he has never quitted the alley he entered. He may lie down and rest for the night, and continue his journey the next day, and the next, and not discover his error until he begins to wonder when he shall reach his destination. He now begins to fear that he has strayed from his course, and watches the trees narrowly as he passes along, until at length he remarks some stain, some piece of torn bark, or some peculiar patch of moss on the trunk of one of the trees, and fancies that he has seen it before. Still he walks on, until, perhaps, before long, perhaps not for hours, he remarks it again, and then he discovers, to his consternation, that he has been travelling in a circle.

He tries again and again to keep his course, but with a similar result; he has no means of guiding himself but his eyes, and he finds that they are of no avail. Perchance, in course of time, he may emerge from the forest at a spot far distant from his destination, or he may fall in with some backwoodsman, or hunter, or more experienced traveller; but it is as likely that he will wander on unavailingly, until he faints with hunger and fatigue, and lies down to die. Years after, some redman or hunter may come across his bleached bones beneath the trees.

The Indians, and backwoodsmen, however, find their way with the utmost facility, by means of marks and signs familiar to themselves, though unintelligible and often imperceptible to strangers, to whom, even with the aid of a pocket-compass, forest travel is extremely difficult, since they must stand to set the compass after every few yards of progress, to save themselves from going astray.

Henry Talbot smiled to himself at the notion entertained by the settlers whom he had just quitted, that he would find himself at fault in the forest.

"What can be more simple," he murmured, as he gazed admiringly down the long alleys formed by the trees, stretching away to a distant point in every direction—"what can be more simple than to keep straight on through one of these alleys, if a fellow be careful in the first instance to select the right one? Let me think. A bee-line, due west. That was the direction. I am all right; and a walk of twenty miles over this soft turf is a precious sight easier task than many a day's journey that I have performed of late. Shaded from the sun; no streams to ford; no hills to climb! Why, I ought to reach Watertown with ease in six hours at the utmost."

Thus satisfied in his own mind, he stepped briskly forward, charmed with the impressive novelty of the scene.

Completely shut in by trees, the many cheerful sounds, which in the early summer morning had made music in the air, became suddenly inaudible. The sudden lapse into silence was almost awe-inspiring. He could not hear his own footfall, nor could he see his own shadow on the springy turf. He felt as if he were the spirit of that vast silent solitude. It was a grand sight to gaze through the long alleys of trees, seemingly planted by rule and compass, so regular was the space between each trunk. It was a grand sight to look upwards at the leafy canopy which shut out the sky from view. The atmosphere he breathed was heavy with the perfume of the pines and cedars; and, scarcely heeding whither he went, yet fancying that he kept the same straight path, he wandered on, taking no thought of time or distance, until a slight sensation of hunger and fatigue warned him that it must be time to partake of his midday meal.

The watch he had brought from England had become the spoil of the pirates in the Gulf of Mexico; but he had purchased a cheap watch at St. Louis, and on consulting it he discovered that it was already past noonday, and that he had been five hours in the forest.

"I must have walked at least eighteen miles," he thought to himself; "and I ought to be nearly through the forest. They told me the clearing extended two miles from the settlement, and I should by this time be getting a glimpse of the outer world again. It's all very pleasant for a while; but a fellow gets wearied with the sameness, and I shall be glad to see the blue sky once more, instead of this dark-green roof of branches."

He seated himself and ate his dinner, and rested an hour, and then again set forth on his journey, expecting every moment to see the bright daylight beaming in through the trees ahead.

Another hour passed away, and again consulting his watch, he thought—

"I must have walked slower than I fancied I was walking, or else those fellows at the settlement count Irish miles instead of English ones!"

When, however, another hour had slipped away, without the appearance of any sign to indicate that he was near the edge of the forest, he began to be alarmed, and to suspect that he had really missed his way.

"Three o'clock!" he exclaimed. "If I go on thus it will be dark before I escape from the forest. Can it be possible that I have swerved from the path? I don't think it; and yet I ought to have reached the clearing ere now."

Still he walked, wondering if it were really possible, if a traveller walked steadily on, that he could by any chance swerve from the alley of trees through which he was walking.

It seemed to him quite impossible; and, attributing his delay in getting clear of the forest to a wrong estimate of the distance on the part of the people who had directed him, he increased his pace, fearful lest darkness should overtake him. He had remarked that the afternoon had become rapidly more and more gloomy; and though he knew that it would be daylight for several hours to come in the "open," he knew not how soon the forest might become wrapped in the dark mantle of night.

"A nice treat it would be to camp down in the forest all night!" he thought to himself; "though I have camped in worse quarters. But then I expected to camp out. Now I hoped——What's that?" he suddenly cried aloud.

This exclamation was caused by the appearance of some object which glittered in the dim light, at the foot of a tree a few yards in advance; and on reaching the spot he discovered, to his chagrin and consternation, that the gleam of light came from a bottle—the very bottle that he had brought with him from the settlement that morning, and which had contained the water that he had drunk at his noonday meal. He had thrown the bottle away because it was cumbersome to carry, and now he examined it narrowly, before he could really believe the fact. There was, however, no mistake, and a further search over the turf disclosed other evidences that after a rapid walk of nearly three hours—as he thought straight ahead—he had returned to the spot where he had dined.

"Well, this is pleasant, certainly!" he ironically muttered aloud. "Delightful! I suppose I have been playing this game all day, running round in a circle, like a fellow at a circus. I wonder now whereabouts I really am? whether I'm nearer the lake than Watertown, or whether I've gone astray in a wrong direction altogether. I wish I'd taken the advice of people wiser than myself, now that it is too late; though, how I can possibly have gone astray I cannot imagine. Perhaps," he went on, half vexed, half amused at the dilemma in which he found himself, "the fairies and wood nymphs, whom the march of progress has driven from Europe, have found refuge in the New World, where they still play their tricks upon travellers. I can account for it in no other way."

He considered for awhile what was best to be done. He had already walked a great distance—thirty miles at least, according to his own estimate—and was both hungry and weary.

By pressing on he might only wander still farther out of his path, or else return again to the same spot. In another hour or two the forest would become perfectly dark, and he would be compelled to camp down.* Under the circumstances, he thought it quite as well to camp down at once, before he made himself still more hungry and weary to no purpose; for he had not a particle of food remaining in his wallet, wherewith to satisfy his appetite. He therefore unstrapped his cloak from his shoulders, wrapped it closely round, and lay down, with his knapsack for a pillow, at the foot of the tree beneath which he had dined three or four hours earlier, and, thinking moodily over the continuous succession of mishaps—serious and trivial—which he had suffered since he had left his home, he fell asleep.

He must have slept a full hour, when he woke suddenly, fancying that he heard a human voice at no great distance. He sat up and listened; but as all was still, he supposed himself to have been dreaming, and was about again to compose himself to sleep, when he heard a sound as of leaves scattered in the wind, and presently a youthful and musical female voice was heard to say—

"'Tis of no use, Peppercorn. You *shall* not have your own way. Ah! but you are rightly named, you little vixen. You thought to crush me against that tree; but I'll teach you that I am your mistress. There now—So-o-o. Be a good lass, and we'll go home. In a day or two we'll be the best friends in the world——"

The voice was still speaking, when—treading silently over the yielding turf—a pony appeared from an adjacent alley of the forest, and, seated on a side-saddle on the animal's back, was the speaker, apparently quite a young woman, dressed in a riding-habit and hat and feathers.

The lady's costume, as far as Henry Talbot could discern amid the fast gathering gloom, would not have discredited a lady-equestrian either in London or New York, and, in his astonishment at the unexpected sight, the young man pinched himself to make sure that he was really awake; and even when he had satisfied himself that such was the case, but that he had heard the voice he would have fancied that he beheld an apparition, so unlooked for, in such a spot, was the appearance of the youthful stranger, and so stealthily and silently the horse and its rider seemed to glide towards the spot where he sat.

Suddenly, however, the lady drew the reins, and in a voice in which surprise and some little alarm were intermingled, exclaimed—

"What is that? Who is there?"

"A traveller, madam—an Englishman," replied Henry, springing to his feet and doffing his hat. "I have unfortunately lost my way in the forest."

The young lady appeared to be re-assured by the tone of the young man's voice; but his sudden movement had caused the pony to shy violently.

"Take care, sir, pray take care," she cried. "You frighten my pony. Steady—steady, Peppercorn." Then again to Henry—

"You say, sir, that you are a traveller and an Englishman. Pray may I inquire what has brought you here, away in the backwoods, where we see few strangers, and far from any route that an ordinary traveller would be likely to take?"

"I have come lately from St. Louis," explained Henry. "I left Milwaukie settlement this morning for Watertown, where I wish to see one Mr. Morton."

"To see Mr. Morton!" exclaimed the lady. "Well, sir, you are not very far from Watertown, and Mr. Morton resides there. The question is, though, how you are to find your way there through the forest to-night. If you have lost your way in the daylight, you are not likely to find the path in the darkness, which will soon come on. You must not remain here, at all events, unless you wish to be seized with ague before morning."

* The phrase to "camp down," or "camp out," is applied in the backwoods of America and Canada to sleeping on the bare earth, beneath the canopy of heaven, as well as to resting in a tent or camp. Travelling in a circle is explained by the instinctive tendency to face the light. In the Australian bush many a life has been lost by following the sun. Occasional glimpses of light even in the forest would fatally mislead.

"Pray, madam, what may be the distance from here to Watertown?" inquired Henry.

"Oh not far. About four miles. If you keep that alley to the left (pointing with her whip) until you come to a cedar, mossgrown to full three feet from the ground, and then turn off at a right angle till you come to a pine which has been scathed by lightning—a pine, mind, because you'll come across *three* scathed cedars before you reach the pine; and then—But it will be perfectly dark before that, and you Englishmen are so sure to go wrong when you attempt to thread the forest. I really don't know——"

"I am afraid, madam," replied Henry, smiling at the idea of his following such a direction, "that I should stand a poor chance of getting clear of the forest to-night, if it be left to me to judge between scathed pines and cedars."

"Well, I'm something of the same opinion myself," returned the lady, smiling in her turn. "But don't, pray, address me as madam. Say Miss Morton, or never mind any title. Mr. Morton is my brother. I'll tell you what will be the best plan, young gentleman. Just remain where you are. Don't stir an inch, and I'll hasten home and tell my brother Henry to send one of the hired men, with a led horse. You may thus perhaps yet reach Watertown before the storm comes on. There's a violent storm brewing, but it won't come on until after sunset. Now don't stir from that spot if you value your health—perhaps your life. By the way, sir, I have not inquired your name."

"Henry Talbot is my name," replied the young man.

"Henry Talbot!" exclaimed the young lady, with a start of surprise. "That's strange indeed!" she went on to herself. Then she added—

"Pray don't stir, Mr. Talbot, and in another hour you'll be safe at Watertown. I'm glad I fell in with you;" and, lightly touching her pony with the whip, she darted away at a gallop, and was almost immediately lost to sight in the gathering gloom, leaving Henry still half doubtful whether he was not under the influence of a vivid dream.

CHAPTER XXXII.—IN WHICH HENRY TALBOT FINDS HIS WAY OUT OF THE FOREST, AND ARRIVES SAFELY AT WATERTOWN.

"A STRANGE adventure!" thought Henry Talbot, after the fair apparition had departed. "I could not clearly see her features, but I fancy she is pretty. At all events, she has a pleasant voice. But what a strange way she has with her. Except a little tremor in her voice at first, she did not appear to be at all frightened, while most young women in her position would either have fainted with terror, or have galloped away at full speed."

Thinking over this latest adventure, and wondering what sort of a place Watertown would prove to be, he sat still beneath the tree, or only rose to pace a few steps to and fro, fearful that if he once were to lose sight of the spot he might not be able to find it again, and might, in that case, be compelled to remain all night in the forest. He waited, as he fancied, much more than an hour, and yet there were no signs of the approach of the promised guide. He listened attentively; but not a sound was audible save a low moaning in the air, and a whispering noise among the branches of the trees, foreboding the coming storm.

"Can she have played me false?" he asked himself, "or am I deceiving *myself*, and has all that has passed been mere imagination? am I dreaming still?"

The darkness had closed in so rapidly that he could not, without great difficulty, make out the figures on the dial of his watch. At length, however, he discovered that it wanted a few minutes to five o'clock, and the little more than three quarters of an hour had elapsed since his fair visitant had disappeared.

"I could have declared that two hours had passed away since she left me," he said aloud, as he replaced the watch in his pocket; and the words had scarcely escaped his lips when a slight rustling of the turf caught his attention, and, turning his head, he saw two huge, dim, shadowy objects approaching towards him from the alley in which the young lady had disappeared.

"He hoy!" presently shouted a voice, to which he replied with an "Hilloo!"

"Oh ye're thar, air yer, mister?" was the reply; and the next moment the two shadowy objects stood still before him, and he perceived a man seated on horseback, with a led horse beside him.

"Best meount tew onest, stranger," cried the man. "Thar bean't no time tew lose, I kin tell *yew*. We'll hev it comin' deown young b'ars and catameounts, claws deownmost, afore we get tew hum tew Watertoown."

Henry mounted without a word.

"Got no 'plunder,' I s'pose?" asked the guide.

"Only my knapsack and cloak," answered the young Englishman.

"That's well; hitch'em on tew the saddle. Some folk can't travel 'ithout a hull pile o' plunder. I never carr's more'n a shirt-collar and a baccy-box myself. Now hold on like greim death, stranger, and follow me."

With this the guide cantered off at full speed, followed by Henry, who, in less than ten minutes, found himself clear of the forest.

Although the sky was lowering and gloomy in the "open," and the evening twilight was beginning to set in, the light was for a few moments dazzling to the young man's eyes, so long accustomed to the gloom of the forest. In a little time, however, he was able to look at the country over which he was riding.

As soon as he was clear of the forest, the guide somewhat slackened his speed, and allowed his companion to ride abreast with him, and Henry again inquired the distance to Watertown.

"I reckon heow ye're *in* Waterteown, neow, friend," was the reply. "But if yer mean the *Place*, why it's 'beout tew mile ahead. Ye'll see the houses sune's we git atop o' yon meounting. The forr'st used fur tew reach tew thar."

The "meounting" was simply a slight elevation—a mere rise in the road; but all elevations, from a mere hillock to the loftiest peak of the Alleghanies, are called mountains in the Far-west; and that the forest, at no very distant date, had extended to the rising-ground, was sufficiently manifest by the presence of thousands of charred and blackened stumps—that most dismal and unsightly blemish to the American landscape—which rose up in every direction, imparting to the surrounding country the appearance—to a stranger's eye—of a vast, long disused burying-ground, in which the tombstones had been left to blacken and decay uncared for.* Between these stumps, corn and grain, and various descriptions of produce, were sprouting from the soil; but the absence of hedges, or indeed, except here

* Whenever the forest is levelled to prepare the land for tillage, the stumps of the trees are burnt, and then left to decay with the roots in the ground. There are machines for tearing these roots and stumps from the soil; but the expense and difficulty of removing them are so great that the machines are seldom used, especially as the idea prevails that their gradual decay improves the soil. The stumps occupy several years in decaying, and are to be seen almost everywhere except in the very oldest settled states, though they are most numerous in the West.

and there, of any division of the fields, rendered the landscape dreary and desolate.

Soon large drops of rain began to fall at intervals, and the sky grew darker and darker, and again the "hired man" urged his horse more rapidly onward, and his companion was not slow to follow his example.

At length they reached the summit of the hill, and Henry saw before him, about half a mile distant, a large, straggling dwelling-house, enclosed in rather extensive grounds, which his companion informed him was "the Place." This dwelling was surrounded by a dozen or more log-cabins, and by barns, out-houses, and store-houses innumerable. The cabins all had small gardens attached to them, and the surrounding fields appeared to be in a high state of cultivation; large grazing grounds, a short distance beyond them, were well stocked with cattle and sheep, and hedges alone were wanting to give to the place the appearance of a very extensive English farm.

A few minutes' canter brought them to the gate of the "Place," where a tall, sunbrowned, athletic young man, attired in woodman's costume, yet having the appearance of a gentleman, was waiting to receive them.

"You, sir, are, I presume, the traveller of whom my sister has spoken?" he said, courteously addressing Henry. "Please to dismount, and I will lead you in doors. You are no doubt tired."

"Isaac," to the hired man, "take the horses round to the stables, and be sure that everything is well secured before the shower comes on."

Then, again addressing himself to his guest, he said, "It was fortunate that my sister fell in with you, sir. We are going to have a storm, and our western storms are very violent. You would have found the forest but a poor shelter."

As they drew near the house, Henry, blushingly and hesitatingly, spoke of his attire as being unfit for respectable society.

"Pooh, pooh!" exclaimed the young man, Henry Morton, "it would be strange if it were otherwise than it is, if, as my sister has informed me, you have travelled from St. Louis. The woods and prairies are not beautifiers of apparel. You must do as we all do out in the Far-west when travelling—accept the assistance of your host. I dare say *my* wardrobe will supply you with something that will fit you, and you must make free with it for the present."

The young Englishman was about to expostulate, when he was interrupted by his host.

"Nonsense!" he said; "it would never do out here, to adhere to the conventionalities of life as in the old settlements. We are too glad to welcome a stranger, to hesitate to put all we have at his temporary disposal. By the way, you know my name. Yours, my sister tells me, is Talbot, Henry Talbot."

Henry bowed assent.

"We are namesakes, then, in one sense. And you are an Englishman?"

"Yes, I am an Englishman," answered Henry.

"It is strange," continued the young squire; "my father, who is an Englishman by birth, and who has been for some time absent in England, wrote me some months ago that it was probable that we should be visited by a young friend of his who bore your name. Poor fellow! we looked for him for some time with considerable anxiety; but he will never come to us now."

"From what part of England was he expected?" inquired Henry.

"My father wrote from St. David, in Cornwall, where he met with this young man, who was on a visit to his sister," was the reply.

"Then, in that case, Mr. Morton," said Henry, "I am he whom you expected."

"Sir!" exclaimed the young squire, stopping short as he was about to enter the house, while a look of stern doubt and suspicion came over his features. "The young man of whom my father wrote perished at sea, in the Gulf of Mexico. My father subsequently wrote to that effect. Indeed, his letter only came by the last British mail packet; and, moreover, I have read the newspapers, which gave a full account of the loss of the Amazon, with all on board, except two small boat-loads of passengers and sailors, who landed in Cuba. Henry Talbot was in neither of those boats."

Henry felt that he was suspected to be an impostor, who had assumed the name of Talbot in order to impose upon strangers, and for a moment his face flushed with shame and indignation. He knew not how to explain away the suspicion, and he felt that anything except a satisfactory explanation would only serve to increase mistrust. At length he recollected that he had a letter from the British Consul at New Orleans in his pocket, as well as the letter given to him by the merchant of St. Louis, and, drawing these letters forth, he handed them to young Morton, saying—

"I think, sir, you will be satisfied when you have read the contents of those letters, that Henry Talbot *did* escape with his life, though with little besides, and that *I* am he."

The young man read the letters, and Henry then narrated all the details of the seizure of the Amazon by pirates, the subsequent sinking of the ship, the escape in boats of the passengers and crew, and the arrival of the pinnace at St. Domingo, together with his subsequent adventures in America; and this story, together with his replies to several questions put by young Morton relative to his father, convinced him that his guest spoke the truth.

"Pray excuse me for a momentary doubt and suspicion," he said, seizing Henry's hand. "I am sure now that you are the young gentleman of whom my father wrote, and I sincerely congratulate you upon your escape, and bid you welcome to my father's house. My sister will be rejoiced to hear what you have told me. But it *is* strange that my father has not heard of your escape."

"I suspect," replied Henry, "that the fault rests with me. I knew my sister believed me to have perished, and I would not write to her while I was in a state of destitution. By assuring her of my existence I should only have filled her mind with fresh anxiety."

"There I think you are wrong," said the young squire. "But we will talk over all these matters by-and-by. We shall have lots of questions to ask you about my father, who seemed to have been much attached to you, and wrote of you in high terms of praise, I assure you."

In spite of his expostulations, Henry was forced by his youthful host to proceed at once to the parlour, where Miss Morton was awaiting her brother.

"My sister will excuse everything," he said. "You will have plenty of time to smarten yourself up by-and by. You must be formally introduced at once, or I shall get a scolding from her. What matters your appearance? She saw you in the forest, and you look like what you are—a traveller off a long journey through the wilderness."

Passing along a passage into which rooms opened on

either side, they came at length to a door at the far end, which opened into an apartment handsomely furnished with mirrors, pictures, sofas, lounges, and all the appliances and adornments of modern comfort and luxury. On one side of the room was a row of bookshelves, well filled with books, and on the opposite side stood a pianoforte and music-stool.

Near one of the windows, at the far end, a young lady, elegantly attired, was seated with a book in her hand. She rose at the opening of the door, and, perceiving her brother, came towards him; and, as she drew near, Henry recognised in her the fair equestrian to whom he was indebted for his release from the forest.

"Now what do you think, Mary?" the young man exclaimed, "You told me you were surprised when you first heard Mr. Talbot mention his name. You will be more surprised when I inform you that this gentleman is really our father's friend, whom we so long expected, and whom we believed to have perished at sea."

THE WORKSHOP REGULATION ACT.

The Act of Parliament which bears the above title, and which is gradually coming into operation, has been called the Magna Charta of English childhood—a high-sounding designation, but not an inappropriate one when we realise the fact that by its various clauses it takes the working child and the growing lads and lasses of the factory and the workshop from under the arbitrary jurisdiction of the employer, and subjects them instead to the regulation of just, humane, and considerate laws. Let us glance briefly at the new regulations, and at some of the effects they are likely to produce.

Premising that the Act* is applicable to factories in the widest sense of the term—that is, to industrial establishments of all kinds where many hands are employed—the first thing that strikes us is the prohibition which excludes children under eight years of age from being employed at all—a clause which will deliver thousands of children from a bondage to which they ought never to have been subjected. A second regulation forbids the employment of any child on Sunday; a third limits the working hours of all children under thirteen years of age to six and a half hours a day; and a fourth compels the attendance of such working children at school for three hours daily, on five days in the week. Thus, where children are constantly employed, two sets of them have to be engaged, one set working in the fore part of the day, while the others are at school, and the other set working in the afternoon, while the morning workers are at school; though this regulation is subject to certain modifications—not at all damaging ones—made to suit the convenience of employers, under the sanction of the inspector of factories.

The parent is required to see that his child attends the daily school; and the employer is bound to ascertain every Monday morning that the child has so attended during the previous week—the school certificate book, filled up by the schoolmaster, being evidence of such attendance on the part of the child. The employer cannot set the child to work without such certificate, and it is therefore his interest to see that the child's attendance is regular; still, no responsibility attaches to the employer for any neglect on the part of the child—all such responsibility being very properly cast on the parent. But here there is a difficulty sufficiently obvious: if a number of children absent themselves from school during one week, or any portion of a week, and cannot be employed during the following week on that account, two evils are the result—the master loses their labour, and his manufacture, it may be, stands still, and the idle children are remitted to further idleness. With a view to obviate this difficulty, Mr. Redgrave, the inspector of factories, proposes a remedy of a simple and practical kind, which, as it punishes the only real offender—the neglectful parent—cannot be too strongly recommended. The plan is merely an arrangement made with the schoolmaster, that he should, whenever a child does not appear in school at the appointed hour, send on the same day the name of the child to the manager or overlooker. If the child ought to have attended school in the morning, by sending the name to the manager he is enabled at once to prevent the child from working that afternoon, and to require the child to go to school instead; the child will thus make up the proper number of school attendances during the week, the parent will forfeit the *day's* wages—an immediate penalty of a moderate amount—and the employer will lose only one day's labour instead of five. If the child miss school in the afternoon, the same process is gone through, the manager forbidding the child to work the next morning, and requiring it to attend school instead. This is not a new arrangement: it has been in operation in many factories for years; and wherever this plan has been adopted it has succeeded in lessening the absences from schools. Although it requires prompt attention at first, yet the punishment follows so rapidly after the discovery of the neglect, that in a surprisingly short space of time children who have been truants, careless, irregular in their hours of attendance, and who have been in the habit of performing domestic duties at home instead of attending school, are transformed into regular and attentive frequenters of school, without the institution of legal proceedings against employers, who are less to blame in the matter than the parents, over whom they have no control, or against parents who err from their inability to appreciate the humane intentions of the Legislature. It appears at first to be a troublesome arrangement; but when it has been firmly carried out, and the children know that non-attendance at school will not be overlooked, and that they will certainly lose a day's wages, they give comparatively little trouble, and attend school as regularly as could be wished; in fact, the attendance of half-timers in many schools is punctual and constant, being frequently better than the attendance of the other scholars who are not under the restrictions of the Factory Acts.

Thus much at present as to the children between eight and thirteen years. Let us turn now to the "young persons," by whom the reader will understand persons of both sexes between thirteen and eighteen years. The Act provides that no female shall be employed on the Sunday, or shall work at any time in any part of any factory, where the melting or annealing of glass is carried on; and that no young person, and no woman, shall be employed either before six in the morning or after six in the evening, or on Saturday after two in the afternoon, with certain reservations.

The effect of these regulations, in connection with those fixing the meal-times, is, that the ordinary hours of work are sixty in a week, namely, ten and a half hours on each of the first five days, and seven and a half on the Saturday. In the winter months, that is, from the first of October to the first of April, the hours of work

* Three separate Acts came into force on January 1st, "The Agricultural Gang Act," referred to at page 165, "The Factory Regulation Extension Act," and "The Workshop Regulation Act."

may be taken from between seven in the morning and seven in the evening, instead of between six and six; but no work can be done later than two in the afternoon on Saturday; though, in order that seven and a half hours may be obtained on the Saturday, the work may begin at six in the morning. One month's notice must be given to the inspector previous to any alteration of the hours of work for the months of winter.

With regard to meals, the Act decrees that one hour and a half must be allowed for meals to all children, young persons, and women, between half-past seven in the morning and six in the evening—one hour being given before three o'clock, and at least half an hour before one o'clock. The time allowed for meals, and the hours at which they are to be taken, are to be stated in the notice hung up in the works. Other conditions with regard to meals provide that they shall not be taken in the same rooms where unhealthy processes are carried on, or where there is not a wholesome provision for ventilation. For the convenience of the employer, or for that of the workers, it is allowed to lessen the time set apart for breakfast or dinner, and to make up to the worker for it by ceasing at an earlier hour in the evening—a practice which has prevailed for years, both in factories and in workshops not subjected to inspection, and has been found to work well.

The question of holidays is not left to be determined solely by the demands of business, or the disposition of employers. No child, young person, or woman is allowed by the Act to do any work on Christmas Day or Good Friday; and, in addition to these customary holidays, eight half-holidays must be given in the year, four of them at least in the summer months, a whole day's holiday being reckoned as two half-holidays.

Special sanitary regulations are enforced for the ventilation of work-rooms, and to prevent their overcrowding, as is also the use of mechanical means for obviating or abating the peril to life and limb attending certain dangerous processes of manufacture. Stringent rules are also laid down enforcing the boxing-off, or fencing of machinery, so as to secure to the workers the utmost possible immunity from danger.

Such, briefly stated, are the principal measures provided by the new Act. It must be evident that to bring them all into force at once, without warning or time for preparation, would only tend to confusion, loss, and hindrance of business. Certain temporary exceptions have therefore been allowed, the effect of which is to delay, unavoidably, the full operation of the Act for a period varying from six months to two years; but such exceptions are of comparatively small import, and it is probable will cease to be practically operative before the expiry of the date the law assigns to them. Again; as many of the regulations above quoted, would, if carried out to the letter, be altogether mischievous in certain branches of modern industry, it has been found necessary to modify the application of them to such departments of manufacture. Thus, in letter-press printing, in the manufacture of glass, in the making of paper, and in various other industries in which men work to catch time, or have to attend on processes which cannot be safely intermitted, it would be impossible to insure that regularity and periodicity which are the normal result of ordinary labour, if the new regulations were strictly adhered to. Modifications of the new rules are therefore made in favour of such trades, and it is in the discretion of the Secretary of State to extend such modified rules to any particular class of industry, should such extension be required by the exigency of trade. It must be understood, however, that these modifications are in no way oppressive to the workers; they do not increase the number of the working hours per week, but only economise the hours by distributing them in such a manner as to secure the efficiency of the work done.

While we can but congratulate the child worker on the protection this Act awards, and on the education it provides for him, one awkward reflection presents itself. The Act does not apply—cannot apply—to children who work at home under their parents' roof. There are tens of thousands of such children in London and the provinces. In London numbers work at home at lucifer-box making, lozenge-box making, the making of card-boxes of various kinds, baby-shoe making, carpet-bag and carpet-slipper making, artificial-flower making, etc., etc. The earnings of all such children are small, often not more than twopence or threepence a day; but where the family is large and the parents poor, they are regarded as indispensable. Now it is to be feared that the child who is shut out of the workshop until he has completed his eighth year will be very little benefited if his work is only transferred to his home, which there is too much reason to fear will be the case. Work at home has no limit as to age, and would seem to have hardly any as to time. It is a fact that in the straw-plaiting districts infants of three to four years are found at work splitting and even plaiting the straw; and in some of the miserable villages of the Black Country one comes upon whole families working at the forge—six or eight of them at one fire—making nails, a task at which boys and girls of five or six are often efficiently skilled, and at which we have found them working up to near ten at night. In many of the handicrafts of Birmingham, again, children far younger than eight are, or used to be, employed in the simpler and easier departments of the work. The question is, whether the closing of the factory and workshop against the very young may not be an injury instead of a benefit to them, unless the law step in also to forbid or to limit the home work and to enforce attendance at school instead. It would be a miserable thing if the new Act were allowed to be defeated by those who make their profits by children's labour; if the work which young children are forbidden to do in the factory be exchanged for work of the same or a different kind which may be done at home.

One of the results of the limitation by law of child labour is likely to be an advance in the price of such manufactures as children take part in producing, and this result is to be expected as soon as ever the operation of the Act begins to be felt by employers. It is not that they will pay more money in wages in proportion to the work done (though it is likely enough that they will have to do that), but rather that in many cases they will get but half a day's work on the same area, and out of the same plant, which have heretofore furnished a whole day's work, and thus their cost of production will be enhanced. This consideration points to another possible result, by no means to be deplored, according to our notion, and that is, the gradual diminution and final abolition in some trades of child labour altogether. For it may well be that the expense and the trouble of superintending two sets of child-workers in one day may render it more profitable, or as profitable and less troublesome, to substitute adult labour in lieu of that of the child. To some extent this is likely to take place at once, but it will hardly be practicable in those branches of industry which are carried on upon an extensive scale, and where the margin of profit is so very small that any increase in wages must swallow up the employer's gains. What may have to be guarded against with reference to such cases and other analogous ones, is the

creation by new circumstances of a new class of middlemen employers, who shall undertake specified descriptions of labour performable by young children, and distribute it broadcast among the poorer families of our larger manufacturing districts. Such a system would effectually defeat the "humane intentions of the Legislature," if it became at all general—in which case we should have a race of industrial baby-farmers comparable to the old rural gang-masters whose exploits aroused such general indignation a short time ago. We will hope, however, that any such evil consummation will be sufficiently guarded against, even if it be not speedily rendered impossible by the forthcoming laws, which are to provide a suitable education for every poor man's child, and which will of course prevent his working while he ought to be learning.

THE MIDNIGHT SKY AT LONDON.

MAY.

BY EDWIN DUNKIN, F.R.A.S., ROYAL OBSERVATORY.

If we refer to our diagram representing the sky south of the zenith for midnight in the middle of May, we shall discover that it is enriched by several of the most celebrated stars of the first magnitude, visible above the horizon of London, as Vega, Arcturus, Altair, Antares, and Spica. In addition to these, the planet Saturn is a conspicuous object in Scorpio, and easily distinguished from the bright stars near it, by the absence of any scintillation, or twinkling. Saturn, for the reasons given in January, is not inserted in the south view, but its position can be seen in the corresponding index map. Many new constellations have appeared in the east and south-east since last month, while the general advance of all the stars from east to west is clearly marked by the altered positions of the brightest objects.

Taking, then, the lower diagram first, the attention of the observer is directed to the zenith, which is now occupied by the constellation Hercules. It is the first time this year that Hercules is wholly contained in the southern half of the sky at midnight. There are one or two stars of the second magnitude, and several of the third in this constellation, some of which are near the zenith, east of the meridian line. Hercules extends over a large portion of this region of the heavens. West of Hercules, and on the meridian, the semicircular group of stars forming the Northern Crown is very conspicuous, its brightest jewel being Alphecca, or Gemma, in the centre. Directly below Corona Borealis is Serpens, with several stars of the second and third magnitudes; and, lower still, very near the horizon, is Scorpio, with its principal star Antares, and several others tolerably bright. Some degrees above Antares Saturn will be recognised. Looking due east, the brilliant Vega attracts our notice, about thirty degrees from the zenith. This star has passed since April 15th, from the northern half of the sky to the southern. Near Vega there are several stars in Lyra of the third magnitude. Below Lyra is Beta Cygni, or Albiero, a double star celebrated for the number of observations made on the colours of its two components. Between Albiero and the eastern horizon are several small constellations, the principal being Vulpecula, Sagitta, Delphinus, and Equuleus, the horizon itself being occupied by the sign Aquarius. In the E.S.E. the constellation Aquila can be distinguished by its group of three stars, the central one being Altair, of the first magnitude. In the diagram, Altair is inserted near the eastern limit; it is, however, about thirty degrees above the horizon. The horizon in the south-east and south is occupied, beginning from Aquarius in the east, by Capricornus, Sagittarius, Scorpio, Lupus, and Centaurus. If we now turn to the west and south-west sky, we shall have little difficulty in identifying most of the constellations and stars, with which some of our readers are probably by this time acquainted. These are Boötes, Coma Berenices, Virgo, Libra, and a few others. Looking due west, Cor Caroli is situated nearly

INDEX-MAP, LOOKING NORTH, MAY 15.

half-way between the zenith and horizon, surrounded always by stars of comparatively small magnitude. The first star of importance from the zenith towards the south-west is Beta Boötis, between which and Arcturus are several bright objects; Arcturus itself being recognised by its ruddy appearance. Farther down in the same direction Spica can be seen. At this time a line drawn from the zenith through Arcturus passes through Spica. Near the south-west horizon, west of Spica, the stars in Corvus are still to be distinguished. Between Cor Caroli and the horizon all the principal stars in Leo can be identified, Regulus being very near to the horizon. This star is not included in the diagram, which contains only a few stars in the most easterly part of this constellation. The horizon from west to south contains parts of Sextans, Hydra, Crater, and Corvus.

INDEX-MAP, LOOKING SOUTH, MAY 15.

The complete list of constellations which adorn the southern half of the midnight sky of May is composed of Hercules, Corona Borealis, Boötes, Coma Berenices, Virgo, Libra, Serpens, Ophiuchus, Aquila, Sagitta, Del-

THE MIDNIGHT SKY AT LONDON, LOOKING NORTH, MAY 15.

THE MIDNIGHT SKY AT LONDON, LOOKING SOUTH, MAY 15.

phinus, Equuleus, Vulpecula, and parts of Sextans, Crater, Corvus, Hydra, Centaurus, Lupus, Scorpio, Sagittarius, Capricornus, Aquarius, Cygnus, Lyra, Leo, and Canes Venatici.

Böotes is one of the principal constellations of the summer evening sky. It is bounded on the east by Corona Borealis and Serpens, on the south by Virgo, on the west by Canes Venatici and Coma Berenices, and on the north by Draco. In the ancient catalogue of Ptolemy, twenty-three stars were included as belonging to this constellation; in the "Historia Celestis" of Flamstead observations of fifty-four have been recorded; while, in the more modern celestial Atlas of Bode, 319 are inserted. Many of those observed by Bode are, however, invisible to the naked eye. Arcturus, one of the most brilliant stars in the northern hemisphere, is situated between the legs of Boötes. In ancient times it was a noted star among mariners, who, however, looked upon its influences with suspicion. The squally weather which generally preceded the autumnal season was ascribed by the Greeks to the power of Arcturus. It is related by Demosthenes "that a sum of money was lent at Athens on a vessel going to the Crimea and back, at the rate of 22½ per cent., with the understanding that unless the ship returned before the rising of Arcturus, 30 per cent. was to be paid."

Arcturus was the first star observed with a telescope in daylight. This feat was announced in 1635 by a M. Morin. It appears, however, that little notice was taken of the occurrence till the year 1669, when the Abbé Picard published the results of an observation of Arcturus, made when the sun was seventeen degrees above the horizon. This discovery created a sensation among astronomers, who were gleaning at this time quite a harvest among the stars by the use of the telescope, lately invented. Owing, however, to the small object-glasses of the first telescopes, which were only toys compared with the magnificent reflectors and refractors of modern days, the astronomer of the seventeenth century was unable to see more than the principal celestial objects. Several important discoveries were, however, made in that century among which may be mentioned the satellites of Jupiter and five of those of Saturn, together with the ring of the last-named planet. We have still preserved, on the walls of the Royal Observatory, the transit instrument used by Dr. Halley at that place, with an object-glass no larger than that of many modern ship spy-glasses. Let us compare Dr. Halley's small object-glass with one lately constructed for Mr. Newall by Messrs. Cooke, with a clear aperture of twenty-five inches, or with the six-feet speculum in the reflecting telescope of the late Earl of Rosse, and we shall not be surprised that the astronomers of the seventeenth century appeared somewhat elated at having seen a star in broad daylight. This is now a very common occurrence. In the winter days, the writer has frequently observed at noon-day, not only such bright stars as Arcturus, Vega, and others, but occasionally some as small as the fourth magnitude. In short, from the beginning of November to the end of February many such are observed on cloudless days with the transit-circle at Greenwich.

Boötes is figured generally as a robust man holding in one hand a club, spear, pastoral staff, or sickle; for at various epochs he has been represented with each of these symbols. The other hand is upraised towards Canes Venatici. When Hevelius introduced the Greyhounds in his "Uranographia," published in 1690, they were attached to Boötes and placed near the hind legs of the Great Bear. Boötes has therefore been called the Bear-keeper, and also the driver of the waggon composed of the seven chief stars in Ursa Major. Arcturus was for some time supposed to be the nearest fixed star to the earth; but there have been many others now found to be much nearer. There is, however, no doubt that it is less distant from us than the great bulk of the stars. Epsilon Boötis, sometimes called Izar, is a double star, interesting for the distinct and contrasting colours of its components, the principal one being of the third magnitude and of a pale orange colour, while the companion is of the seventh magnitude, and of a sea-green colour. This star has been frequently seen double in the daylight, although the companion is so small. It is not known at present whether the two stars form a binary system; if so, its period of revolution must extend over not less than a thousand years. Xi Boötis is another interesting object of this class, the principal star being of the third and a half magnitude, and of an orange colour, and the secondary about the sixth or seventh magnitude, and of a purple tint. The contrast between the colours is very brilliant.

We will now devote our attention to the sky north of the zenith, as illustrated by the upper view. The principal northern constellations visible at midnight on May 15th, are Ursa Major, Draco, Cygnus, Ursa Minor, Cepheus, and Cassiopeia, with portions of Leo, Cancer, Gemini, Auriga, Perseus, Andromeda, and Pegasus. First, let us, as usual, give a rapid glance on the meridian northwards, as far as the horizon. Passing over Kocab and Gamma Ursæ Minoris, the eye falls naturally upon Polaris. This standard star is still apparently in the same position as in preceding diagrams, though, to the astronomical observer, it has performed a part of a revolution since January in a small circle round the north pole, in a similar manner to other stars. Polaris is really distant from the pole about one and-a-half degree; consequently its distance from the zenith or horizon differs about three degrees at its upper and lower transits over the meridian. For our purpose, however, Polaris is sufficiently near to the north celestial pole to serve as a zero-point which may be used as an easy reference for the identification of the other stars. The space between Polaris and the zenith, east and west of the meridian, is occupied entirely by Ursa Minor and Draco. The latter constellation completely separates the two Bears. In an old astronomical volume, printed at Venice in 1448, some very interesting figures of the constellations are inserted, including one in which the two Bears are completely enfolded in the embrace of Draco. Virgil, as rendered by Dryden, says:—

> "Around our Poles the spiry Dragon glides,
> And like a wandering stream the Bears divides."

Although several of the stars in the lesser Bear are of small magnitude, its contour can be readily traced, Polaris being at the point of the tail, and Kocab and Gamma Ursæ Minoris at the other extremity in the direction of the zenith, but slightly west of the meridian. These two stars are easily found, and by drawing a curved line from Kocab to Polaris the intermediate stars, though small, are distinctly visible. Directly north of the zenith, and a little west and east of the meridian, all the bright stars reaching in the west to the Great Bear, and in the east to the constellations Lyra and Cygnus, belong to Draco, the two brightest being Beta and Gamma, almost due east about twenty degrees. The principal portion of the sky west of Draco includes Ursa Major, below which are Leo Minor and Leo, Regulus being near the horizon north of west, but outside the limit of our diagram. The reader will perceive that all the seven principal stars in Ursa Major, Charles's

Wain, are now in the northern half of the sky. He will also notice that the apparent position of this group of stars is very different to that in the first diagram of this series; for whereas the two pointers were in January approaching the upper meridian, they are now farthest from the zenith, and passing onward to the lower meridian below the pole. But their relative positions remain the same, and in whatever part of the sky they may be situated, Dubhe is always nearest to Polaris, and with Merak pointing out its position. The stars in Ursa Major are, perhaps, the most known of any in this part of the heavens, on account principally of their almost equal magnitude. One star Delta, is, however, sensibly smaller than the others, and is suspected to be variable in lustre at intervals of long periods. At present it is ranked only of the third and a half magnitude, while that of the other six is about the second. In the time of Tycho Brahé, Delta was designated of the second magnitude, and in the seventeenth and eighteenth centuries of the third and fourth. A mere glance will show that now it can bear no comparison in lustre with its companions. This great constellation is recommended to the young student as an early lesson in the configuration of the stars; for

> "He who would scan the figured skies,
> Its brightest gems to tell,
> Must first direct his mind's eye north,
> And learn the Bear's stars well."

Below Ursa Major, in the north-west, is the bare constellation Lynx, and near the horizon Castor and Pollux may be seen on very fine nights. Between Polaris and the north horizon are Camelopardus and parts of Auriga and Perseus. The two bright stars, Capella and Beta Aurigæ, are circumpolar, and may be observed near the horizon a little west of north.

The north-eastern part of the sky contains at midnight the constellations Cassiopeia, Cepheus, Andromeda, Cygnus, and Pegasus. Several bright stars in Cepheus may be noticed east of Polaris. Below Cepheus in the N.N.E. is Cassiopeia, with its well-known group called the chair, and near the horizon numerous bright stars in Perseus and Andromeda can be distinguished on brilliant moonless nights. The principal objects in Pegasus can also be seen near the horizon in the E.N.E., while Alpha Cygni can be easily found in the same direction, about midway between the zenith and horizon. Vega, which has hitherto been a conspicuous star at midnight in this half of the sky, has passed over the boundary, and is now included in the diagram of the southern half.

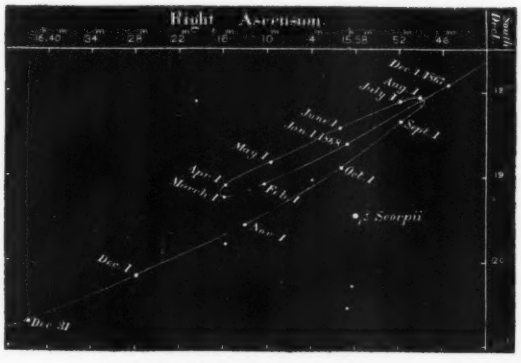
The planet Saturn is now favourably situated for observation, passing the meridian at midnight about the middle of the month. We shall therefore take this opportunity of giving a brief account of his telescopic appearance and position in the solar system. Neglecting the host of minor planets between Mars and Jupiter, the number of which now discovered amounts to ninety-seven, Saturn is the sixth planet from the sun, and is one of the most beautiful celestial objects which come under the notice of the star-gazer. Saturn is a stupendous globe, about seven hundred times greater in volume than the earth, surrounded by a series of rings of solid matter, and accompanied in his course around the sun by eight satellites. All this complicated system moves with a common motion so exact that no part interferes with another in their revolution round the sun, which is performed in rather less than thirty years. The mean distance of Saturn from the sun is more than nine times that of the earth, and nearly double the distance of Jupiter. The equatorial diameter of the ball is 74,000 miles, while its polar diameter is about 66,000 miles; its form is therefore sensibly elliptical, and is something of the shape of a well-flattened orange. Streaks of light and shade have been observed on the ball, very similar to the better known belts of Jupiter, affording some kind of evidence of the existence of currents of air analogous to our trade winds. This supposition would lead us to infer that the surface of Saturn is surrounded by an atmosphere subject to all its attendant meteorological phenomena. Saturn revolves on his axis in 10h. 29m. 16s., consequently a Saturnian day is less than a half of a terrestrial day.

But the system of rings which encircle the central ball of Saturn is by far the most interesting appendage of this magnificent planet. Before the invention of the telescope, the existence of the rings was unknown. Even the veteran Galileo was unable to view them satisfactorily, owing to the low penetrating power of the telescopes of his time. According to M. Arago, this low-defining power of Galileo's telescopes was a source of great perplexity to him. In a letter to the Grand Duke of Tuscany, he announced that the planet was "three-bodied," remarking that when he observed Saturn with a telescope magnifying thirty times, the central object appeared the greatest, the two others being attached, one on the east, and the other on the west side of the principal ball. At a later period Galileo observed Saturn at the time of one of its equinoxes, when the plane of the ring passes through the sun, which then illuminates only the edge of it. On this occasion Saturn appeared to the illustrious astronomer as a perfectly round object; he was therefore led to conclude that his previous observations were nothing more than optical illusions. Galileo died in 1642, and it was not till Huyghens observed the rings, in 1659, that a true explanation of the cause of the phenomenon was given. The gradual improvement in the construction of telescopes soon, however, supplied the means for observing the form and dimensions of the two bright rings as we see them at the present day, excepting only that the superior definition given by modern telescopes has enabled us to make further discoveries of great importance. For instance, the exterior ring, or that farthest from the planet, is seen separated from the intermediate ring by an empty space, showing that they are quite independent of each other. Between these and the ball of the planet, a dusky, or semi-transparent ring has been observed during the last twenty years. The tint, or colour of the rings, is varied, the intermediate ring being the most brilliant of the three. The two exterior rings are opaque, and cast a very decided shadow on the disk of Saturn; but the dusky ring is evidently of a gaseous nature, as a part of the luminous disk can be seen through it. The thickness of the rings is very minute, so much so indeed, that when the edge is precisely directed to the sun, it is nearly invisible even in telescopes of great power. It is assumed from this that the thickness cannot be much greater than 200 miles. At these times of Saturn's equinox, he has the same globular appearance as the other large planets, and advantage is always taken of the invisibility of the rings to obtain accurate measures of the form of the central ball. The phenomenon of the disappearance of the rings of Saturn takes place at intervals of about fifteen years.

The mass, or weight of Saturn, is about ninety times greater than that of the earth. The density is, however, only about the eighth part of that of the earth, or, in more familiar words, a cubic foot of the material of Saturn is eight times lighter than a cubic foot of the material of which the earth is composed. Saturn moves

in his orbit around the sun at the rate of 21,220 miles per hour, and also turns on his axis at the equator 22,216 miles in the same time. It is impossible for any one to view this magnificent object through a large telescope without admiration, especially when the planet is in such a position with respect to the sun and earth, as to exhibit the fullest extent of the rings. Many observers have on such occasions made elaborate drawings, showing all the minute peculiarities of the planet—those by Mr. Warren De la Rue and Mr. Dawes being almost perfect delineations of the disk and rings. Of the eight moons of Saturn, five were discovered between 1655 and 1684—two by Sir William Herschel, in 1789, and one by Messrs. Lassell and Bond, in 1848. The satellites of Saturn are distinguished by the names of Titan, Japetus, Rhea, Dione, Tethys, Enceladus, Mimas, and Hyperion. The three last are very faint objects, visible only occasionally in our largest telescopes. It has been remarked by Sir John Herschel, that at the time Enceladus and Mimas were discovered by his father, "they were seen to thread, like beads, the almost infinitely thin fibre of light to which the ring, then seen edgeways, was reduced, and for a short time to advance off it at either end, speedily to return, and hastening to their habitual concealment behind the body."

The following diagram of the path of Saturn is interesting to show the apparent motion of the planet in the heavens from December 1st, 1867, to December 31st, 1868. It must not be supposed, however, that the true path is so irregular as it appears in the diagram, as the apparent retrograde motion from April 1st to August 1st is merely the effect of the direct motion of the earth in its orbit, being, with respect to the stars, relatively greater than that of Saturn. As viewed from the earth, Saturn, for this reason, seems to go backwards in the heavens with respect to the stars near his path.



APPARENT PATH OF SATURN.

On the following days and hours in other months the aspect of the sky will be similar to that at midnight on May 15th. Our diagrams for this month will therefore serve for 10 P.M. on June 15th, for 8 P.M. on July 15th, for 2 A.M. on April 15th, for 4 A.M. on March 15th, and for 6 A.M. on February 15th.

No very striking astronomical phenomenon takes place in May, 1868. Venus is still the most conspicuous evening star, and will adorn the north-western sky till nearly midnight. She sets below the horizon at 11.43 P.M. on the 1st, at 11.49 P.M. on the 15th, and at 11.26 P.M. on the 31st. She will be at her greatest easterly elongation on the 7th.—Mars is a morning star, but is not yet in a favourable position for observation. He rises on the 1st at 3.52 A.M., and at 2.35 A.M. on the 31st. Jupiter is also a morning star, rising on the 1st at 3.27 A.M., and on the 31st at 1.41 A.M. These two morning planets can only be observed shortly before sunrise.—Saturn is more favourably situated in May than the other planets, being in opposition to the sun on the 23rd; but his low altitude, even when on the meridian, prevents the observation of many of those minute peculiarities of his system, some of which we have briefly described in this article. He is visible in the south-east in the early evening hours, in the south at midnight, and in the south-west in the early morning hours.—The moon will be near Saturn on the morning of the 8th, the planet being nearly three degrees south of the moon. On the 18th she will be near Jupiter. Venus and the moon will be in conjunction on the evening of the 25th; they will be, however, separated by about six degrees; and on the 27th the moon will precede Regulus. Full moon will take place on the 6th, at 6.37 P.M., and new moon on the 22nd, at 6.36 A.M.; and in the last and first quarters on the evenings of the 14th and 28th respectively. The moon will be farthest from the earth on the 13th, and at her least distance on the 25th. In the summer months, when at her greatest phase, or full moon, she is always low down near the south-east horizon in the evening hours after sunset, and passes the meridian at midnight, at a low altitude, due south.

CORAL AND THE CORAL FISHERY.

BY THE AUTHOR OF "WHAT I SAW OF THE AMBER TRADE."

THE immense extent of coral formation found in various parts of the world is seldom fully realised by the many millions of people who only see small fragments of this substance fashioned into ornaments, and exposed either for sale or the gratification of vanity.

When we reflect that the great "Barrier Reef," one thousand miles long, on the north-east coast of Australia, and many other reefs nearly as great in extent in other places, are the growth of animal life, we might almost excuse the belief of the ancient Greek philosopher, that the whole world is either one animal, or a mass of insects.

The growth of what is erroneously called "coral plant," assumes many forms. Sometimes they resemble a gigantic plant, with flowers and leaves. Often they grow like a large tree with leafless branches. Sometimes one stem spreads out into a broad, flat surface, in shape of a fan. Whatever shape the growth of coral formations takes, there is an astonishing regularity in maintaining an equilibrium, each branch being balanced by another opposite, and each stem or main body growing perpendicular to its plane.

Coral, as we see it here, is the bone or shell of an insect, from which the flesh or living substance has been removed. A living branch of coral, when first taken from the sea, has a rough, irregular surface, covered with a slimy substance, and dotted with little spots of what appears to be red jelly. These spots are the coral insects. Examined minutely when growing in the sea, the insect is seen in thousands, each having a room of its own, which it never leaves.

In many kinds of the polypi, or coral insects, the head has a little parasol-shaped cover. The arms, which are furnished with eight claws, are long in comparison with the body, and are generally seen extended for the supposed purpose of gathering food; but what that food really is, I am unable to say.

It is generally supposed that the coral insect is industrious; that it is a builder; and that by its labours, commenced at the bottom of the sea, the coral islands have been formed. This is only partly true. They live and multiply—that is all; and in doing this, a family that starts a habitation at the bottom of the sea, in time reaches the surface at low-water. The structure they form is not elevated one inch above the sea level, for the insect can only live in the warm salt water.

The older the coral shells or bone, the stronger is the colour, and the more difficult it is to procure. The money value of coral depends wholly on its scarcity, or the difficulty of obtaining it, although, as far as use or ornament is concerned, one kind is worth in reality as much as another.

At Honolulu and other places on the Pacific Islands, I have seen houses built of coral, which was as common as granite or sandstone here, and was worth no more. If the many-headed public, who suffer the sorrows of following fashion, could be made to believe that this common coral was seldom found, and was procured with great danger and difficulty from a depth of five hundred feet under water, it would immediately discover some heretofore hidden beauty in that particular kind of coral, which would become a valuable article of commerce. Those who are enslaved by fashion are very sharp in learning from others what is common from what is rare; and, without the slightest regard for the use of an article, the merchants who live principally by the vanity of others, regulate their prices.

To witness the forms of coral structures, one would think that the insects must have some means of communicating with each other at a distance, although they cannot leave their shells. Naturalists may be able to account for some of their peculiarities, but to me there is a mystery in the way they manage to construct formations of coral rock on mathematical principles. When growing in the shape of a tree, what teaches the insect to withhold extending its branches farther in one direction than another? When one tribe of insects commence a structure in the bottom of the Pacific, what enables them to extend it in two directions in a perfect circle until the two ends meet, forming a ring from half a mile to ten miles in diameter? What tells these insects, working in opposite directions, as generations after generations are moving farther from each other, that the circle they are building shall be a large one or a small one? These things, to an observing sailor, unacquainted with the theories of the learned, are always a mystery.

Amongst the South Sea Islands there is a little trade for coral; yet not much is done in fishing for it in the manner I have seen followed in other places. Most of the coral gathered there, of a quality valuable in the market, is obtained in small quantities from the shores of islands surrounded by a coral reef. Fragments of the reef become detached from the main body, and in violent agitations of the sea by storms, pieces of the right kind are sometimes thrown within the view and grasp of man.

The only opportunity I have met for seeing the coral fishery conducted on what may be called an intelligent manner, was off the coast of Africa, where for a few days I was near some natives of Algiers, who were fishing for coraline plants in the same manner pursued in the Strait of Messina. The coral fishery I witnessed was carried on from three feluccas anchored in about seventy fathoms of water. A felucca is the largest and fastest boat used. It has three masts with *lateen* sails, and a jib on a short bowsprit. It is also furnished with long strong oars. During the time I remained near those engaged in the fishery, all three were visited, and I became familiar with the mode of gathering coral; but, being unable to converse with the men, I could learn nothing about the trade.

Two strong poles, about twenty feet long, are firmly fastened together at the middle, and at right angles to each other. On the under side of the poles is a net made of strong cord, and fastened to the extremities of the poles. A heavy stone, for the purpose of sinking the poles, is fastened where they cross each other, and a strong line is also tied at the crossing. One end of the line is held aboard the felucca, and the net is launched over where the coral branches are supposed to be growing beneath. The net sinks slowly to the bottom; and should it fall over the spot where coral is growing, some of the branches generally become entangled in its meshes, and are broken off and hauled up.

When the net and poles become firmly entangled below with large branches of coral, much force has to be used in freeing them, and often the end of the line has to be fastened to the windlass, and a few turns given to bring the net from the bottom. Only small portions of any large mass brought up on such occasions are of any value. Sometimes the net becomes so firmly fastened below, that it is torn in pieces in extricating it. It not unfrequently happens that the line by which the net is drawn up breaks, although, to avoid this, it is always made of larger and of stronger material than the net. Often the net is pulled to the surface and not the smallest fragment of coral is found attached to it. On one occasion I saw, as the net was brought near the surface, a large branch of bright red coral, which was hailed by the Algerine fishermen with shouts of delight. The instant the poles spreading the net touched the stem of the felucca, the branch, which was only hanging by what is best described as a twig, broke away and was lost. There was a sudden transformation of Algerine features from expressions of joy to those of anger and disappointment.

Notwithstanding these little misfortunes, the coral fishers are engaged in a profitable business, and make during the season, which lasts from the middle of April to July, enough to keep them, with a little economy, the remainder of the year. Should they be successful at every cast of the net, the coral, such as they procure, would become too common to please those affected with an insane desire for anything that requires time and toil in procuring.

The price of rough coral varies according to its quality and colour. The whims of changing taste, or want of taste, and the quantity in the market, have much to do with its value. I have seen it sold for about two shillings per pound, and have seen some sold for more than fifteen shillings. The great market for all the cheaper kinds of coral sold, is Africa, where it is an important article of commerce, finding its way far into the interior of the country, and is eagerly purchased by the natives for ornaments.

DER BLAUEN SEE.

In a corner of the French picture-gallery in the Paris Exhibition, there hung a small picture which, at a passing glance, might be thought an over-coloured and exaggerated fancy landscape. It represented a little blue lake, surrounded by rugged rocks, dark fir-trees, and all the charming accompaniments of Swiss scenery. Many pleasant associations recurred to my mind as I

recognised the scene, which I will now endeavour briefly to describe by way of protest against any charge of excessive colouring or artistic licence in the picture.

We had been travelling in Switzerland—a merry party of nine—and arrived one bright August afternoon at Kandersteg, the well-known village at the northern base of the Gemmi Pass. No sooner had we arrived there, however, and installed ourselves comfortably in Hôtel Victoria, than a fog came on, accompanied by large, heavy intermittent rain-drops. This did not augur favourably for the weather on the following day; and, as we had been unfortunate in crossing the Great Scheideck and Wengern Alp, entirely enveloped in clouds and rain, we decided to halt a whole day at Kandersteg, hoping that the weather might clear for the passage of the Gemmi. It grew very chilly as the evening wore on, and we were all delighted when the civil waiter, hearing our exclamations at the cold, brought in an armful of wood and quickly lit up a blazing fire. Two young English tourists came in about seven o'clock, tired and hungry, and after they had finished their evening meal we grew sociable, and endeavoured to arrange ourselves in English fashion *round* the fire. This was difficult, with the fireplace most awkwardly built quite in a corner of the *salle à manger*, and we must have formed a curious-looking group when we were all seated, with one whose feet were cold perched on the high mantel-shelf, and another, who had been bathing in a glacier-stream, and wanted to dry his hair, squatted on a low stool, with his head up the chimney. I forgot to mention a very pleasant French artist staying at the hotel, whose name we did not hear, though I have every reason for believing him to be the painter of the picture described, in the Paris Exhibition.

I always seized opportunities of this kind to study and compare the guide-books, of which we carried four by different authors. As I was doing so this evening, one of the Englishmen remarked that the prettiest sight in the neighbourhood was not mentioned in the guide-books.

"Indeed!" I replied. "May I ask what it is?"

"It is a small lake," he answered, "about two hours from here, between this and Frutigen. We were told of it by a Swiss, and we turned out of the road this afternoon to see it."

"Go and see it by all means," echoed his companion. "It is in its way quite a wonderful sight, or at least very interesting, and deserves to be much better known by tourists than it is."

I instantly turned to Ball's "Alpine Guide," my favourite amongst the books, fully expecting to find a description of it there, in spite of what had been said to the contrary; but no: the young tourist was quite right; it was mentioned neither in Ball, Baedeker, Murray, nor Bradshaw. The French artist was also enthusiastic about the little blue lake, and told us that it was known by no other name than Der Blauen See, and how he had sketched it, and what a unique study it made for a picture. We instantly resolved to make an expedition thither the following day, should it prove fine enough.

I started in the afternoon with one of my companions, and, after descending the steep hill that leads up to Kandersteg, retracing our steps of the day before, and walking for about an hour, we came to a bit of ruined castle, perched on a high rock that rises close to the road, on the right-hand side walking north. This was to be our land-mark; for we had been told to turn in from the road on the left, just opposite this old ruin.

We soon spied a footpath, leading across a plank laid over a narrow stream, and through some meadow-land bestudded with flowers. We followed this path, and presently saw a boy approaching us from a châlet on the other side of the meadow. He was a poor cretin, and could give us no information. The footpath, however, only led up to the châlet, at the door of which a woman sat knitting. From her we again attempted to learn the whereabouts of the Blauen See, but were again unsuccessful. Whether that châlet was inhabited by a family of cretins, I know not; but the woman only shook her head helplessly and muttered unintelligibly.

Returning to the road, we accosted two men who were building a châlet close by. They seemed very honest and intelligent, and when I held up forty centimes, and promised them to the man who should guide us to the Blauen See, one of them instantly threw down his tools and led the way.

We followed him by a little path very much like the one we had taken ourselves, but at a point rather higher up the road. Then began a real scramble, with no kind of path to guide us, first up a grassy hill, then through a wild glen, down which a little mountain stream was hurrying. This our impromptu guide pointed out as issuing from the Blauen See. Then we crossed the Kander (that flows all through this valley into the Lake of Thun), by a rough plank thrown over it; and after issuing from the wood, and climbing another steep grassy knoll, we looked right down upon the little blue lake. It was surrounded on two sides by fir-trees growing down to the water; on another by the steep rocks that bounded the narrow valley we were in, and on the side from which we overlooked it by low rocks rising roughly from the water's edge, but sloping away from the lake into rich meadow-land literally strewn with flowers.

The water was intensely blue—not the hazy cobalt of Lake Leman, or the greeny blue of a deep sea, but a clear dark blue, unlike anything either of us had ever seen before. Two or three of the fir-trees had been uprooted—apparently by some tempest—and fallen into the lake; there they lay covered with what looked like a glistening crystalline deposit, every twig being distinctly visible through the clear blue water. This transparency was another peculiarity about the little lake; it was so clear, we could see every pebble that lay at the bottom, shining white and silvery like the fir-trees, for everything looked perhaps whiter than it really was, by contrast with the dark blue water.

This naturally deluded us into imagining the lake to be but a few feet in depth, though the artist told us afterwards that it was really much deeper.

I do not know whether I have done full justice to the beauty of the scene, or whether I have succeeded in conveying to my readers the same impression that it made upon me. It was little short of enchantment, and just as if some woodland fairy, wishing to prolong a moonlight effect, had by a touch of a magical wand changed every hue to silver and blue, and then carefully hidden it away from mortal eyes. Perhaps it would have looked still prettier in the sunshine; for I should mention that the sun had set, or rather disappeared behind the hills, by the time we arrived at the spot, although it was only half-past four on an August afternoon. It is often the case in these mountain regions for the sun to rise and set in the deep valleys several hours after or before it does so to the rest of the world. The inhabitants of the valley of Lauterbrunnen, for instance, never see the sun in winter until twelve o'clock in the day.

We were vexed when, with all our efforts, we could not make our guide understand that he might leave us to rest there, and find our way into the road again ourselves, for he persisted in waiting to conduct us back. He then led us partly round the lake, through the fir-wood, and along a wilder path than the one by which we had come. He pointed out the bit of ruined castle on the rock as Der Felsenberg, and when he had put us into the road again, civilly wished us good night, and went off quite contented with his forty centimes.

We sat round the fire that evening, discussing the cause of the singular blueness of the Blauen See. One thought it must be due to the action of sulphate of copper on the water, and all wished that we had brought some away in a bottle for analyzation.

We were also comparing it with the Oeschinen See, another lake in the neighbourhood of Kandersteg, whither, in tourist-like obedience to guide-book directions, we had all made an excursion the same morning. I greatly preferred the Blauen See, but others differed from me; and certainly the Oeschinen See is romantic enough. Its celebrity consists in its great altitude, and in being entirely surrounded by snow-peaks (the principal of which is the Blümlis Alp), except on the west side, where a narrow valley opens on to a wild ravine, by which we ascended to see it. A German family joined us for this excursion, and we made a merry party altogether; consisting of five ladies and an elderly gentleman on horses, two ladies who were unequal to riding, in *chaises-à-porteurs*, eight bearers with two assistants, and six pedestrians. We had not gone far when one of the men commenced singing a wild Swiss air. His nine companions joined him one by one, in perfect harmony, and swelled the chorus till it echoed and re-echoed among the mountains, and then the voices gradually fell off until it quite died away. They kept on bursting out with it in this way one after another, during the whole expedition.

It appeared that they always began to sing as they came to a rough or difficult part of the road, to warn one another of it, and cheer themselves on. It would be well if we could all learn the life-lesson contained in this simple incident, to cheer the rough places in life's pilgrimage with songs of warning and encouragement. The fact that most of the men belonged to one family, by name Ogi, who act as guides, porters, bearers, etc., to the numerous visitors to Kandersteg, or travellers over the Gemmi, may partly account for the exquisite way in which their voices harmonised.

The Oeschinen See is much larger than the Blauen See, and this, with the snow peaks round, makes perhaps a grander scene than the other; but for all that I like the little blue lake best, and was delighted to recognise it as a perfect gem in landscape scenery, amongst many larger paintings in the French Exhibition.

THE REIGN OF LAW.

It is interesting to note how two independent thinkers, exercising their minds on the same general topic, in different ages, both with the same grand wish to glorify God as the moral Governor of the universe, have unconsciously approached each other. We subjoin from the famous treatise of Hooker, "Ecclesiastical Polity," and from the now famous work of the Duke of Argyle, "The Reign of Law," parallels, not of language, nor of sentiment, nor even of thought, but of general subject. The profound conceptions of the great Elizabethan divine are in fine contrast with the practical, clear, and full illustrations of the modern philosopher. Space will only allow the following instances:—

DESCRIPTION OF LAW.

From Hooker.

All things that are, have some operation not violent or casual. Neither doth any thing ever begin to exercise the same, without some fore-conceived end for which it worketh. And the end which it worketh for is not obtained, unless the work be also fit to obtain it by; for unto every end every operation will not serve. That which doth assign unto each thing the kind; that which doth moderate the force and power; that which doth appoint the form and measure of working—the same we term a Law. So that no certain end could ever be attained, unless the actions whereby it is attained were regular; that is to say, made suitable, fit, and correspondent unto their end, by some canon, rule, or Law, which thing doth first take place in the works even of God himself.

From the Duke of Argyle.

The whole world around us, and the whole world within us, are ruled by Law. Our very spirits are subject to it—those spirits which yet seem so spiritual, so subtle, so free. How often in the darkness do they feel the restraining walls—bounds within which they move—conditions out of which they cannot think! The perception of this is growing in the consciousness of men. It grows with the growth of knowledge; it is the delight, the reward, the goal of Science.

THE UNIVERSE WITHOUT LAW.

From Hooker.

Now, if Nature should intermit her course, and leave altogether, though it were but for awhile, the observation of her own laws; if those principal and mother-elements of the world, whereof all things in this lower world are made, should lose the qualities which now they have; if the frame of that heavenly arch erected over our heads should loosen and dissolve itself; if celestial spheres should forget their wonted motions, and by irregular volubility turn themselves any way, as it might happen; if the prince of the lights of heaven, which now as a giant doth run his unwearied course, should, as it were, through a languishing faintness, begin to stand, and to rest himself; if the moon should wander from her beaten way; the times and seasons of the year blend themselves by disordered and confused mixture; the winds breathe out their last gasp; the clouds yield no rain; the earth be defeated of heavenly influence; the fruits of the earth pine away, as children at the withered breasts of their mother, no longer able to yield them relief; what would become of man himself, whom these things now do all serve? See we not plainly, that obedience of creatures unto the law of nature is the stay of the whole world?

From the Duke of Argyle.

Each force, if left to itself, would be destructive of the universe. Were it not for the force of gravitation, the centrifugal forces which impel the planets would fling them off into space. Were it not for these centrifugal forces, the force of gravitation would dash them against the sun. The orbits, therefore, of the planets, with all that depends upon them, are determined by the nice and perfect balance which is maintained between these two forces; and the ultimate fact of astronomical science is not the law of gravitation, but the adjustment between this law and others which are less known, so as to produce and maintain the existing solar system.

THE RESULT OF THE INQUIRY.

From Hooker.

Wherefore that here we may briefly end. Of Law there can be no less acknowledged than that her seat is the bosom of God, her voice the harmony of the world; all things in heaven and earth do her homage, the very least as feeling her care, and the greatest as not exempted from her power; both angels and men, and creatures of what condition soever, though each in different sort and manner, yet all, with uniform consent, admiring her as the mother of their peace and joy.

From the Duke of Argyle.

The laws of nature were not appointed by the great Lawgiver to baffle his creatures in the sphere of conduct, still less to confound them in the region of belief. As parts of an order of things too vast to be more than partly understood, they present, indeed, some difficulties which perplex the intellect, and a few also, it cannot be denied, which wring the heart. But, on the whole, they stand in harmonious relations with the human spirit. They come visibly from one pervading Mind, and express the authority of one enduring Kingdom.